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Coordination of space-related activities within the United Nations system: directions and anticipated results for the period 2018–2019 — a United Nations that delivers

Report of the Secretary-General

I. Introduction

1. In its resolution 72/77, the General Assembly urged the Inter-Agency Meeting on Outer Space Activities (UN-Space), under the leadership of the Office for Outer Space Affairs of the Secretariat, to continue to examine how space science and technology and their applications could contribute to the 2030 Agenda for Sustainable Development, and encouraged entities of the United Nations system to participate, as appropriate, in UN-Space coordination efforts.

2. UN-Space is the focal point for coordination and cooperation in space-related activities. It was set up in the mid-1970s with the aim of promoting synergies and preventing duplication of efforts related to the use of space technology and applications in the work of United Nations entities.

3. At its thirty-seventh session, held in Geneva on 24 August 2017, UN-Space noted that the Committee on the Peaceful Uses of Outer Space, at its fifty-ninth session, in 2016, had welcomed with appreciation the report of the Secretary-General entitled "Coordination of space-related activities within the United Nations system: directions and anticipated results for the period 2016–2017 — meeting the 2030 Agenda for Sustainable Development" (A/AC.105/1115).

4. At the same session, UN-Space agreed that the reports of the Secretary-General on the coordination of space-related activities within the United Nations system served as a strategic tool for the United Nations to avoid duplication of efforts in the field of space science and technology, and that future reports should continue to highlight the efforts of the United Nations system entities in delivering as one in space-related activities to further the development agenda.

5. Also at that session, UN-Space reviewed its reporting structure and agreed that the reports of the Secretary-General on the coordination of space-related activities within the United Nations should continue to be issued on a biennial basis. UN-Space also agreed that the upcoming report of the Secretary-General on the coordination of space-related activities within the United Nations system: directions and anticipated results for the period 2018–2019, to be presented to the Committee on the Peaceful

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Uses of Outer Space at its sixty-first session, in 2018, should focus on reinforcing synergies in efficiency measures in the use of space science, technology and applications within the United Nations system in supporting global development efforts.

6. The focus of the present report stems from the recognition by the Secretary-General, set out in his report entitled "Repositioning the United Nations development system to deliver on the 2030 Agenda: ensuring a better future for all", that there was an urgent need for the United Nations development system to move beyond coherence and coordination towards greater leadership, integration and accountability for results on the ground (see A/72/124–E/2018/3, para. 119).

7. To assist the Committee in its preparations for the fiftieth anniversary of the United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE+50), to be commemorated in 2018, the present report contains an overview of the efforts made by United Nations entities to contribute to the four main themes known as pillars, namely space economy (the development of space-derived economic benefits), space society (the evolution of society and societal benefits stemming from space-related activities), space accessibility (all communities using and benefiting from space technology) and space diplomacy (building partnerships and strengthening international cooperation in and governance of space activities). For more background on UNISPACE+50, see A/AC.105/1137.

8. The present report, which is the thirty-eighth report of the Secretary-General on the coordination of space-related activities within the United Nations system, was prepared by the Office for Outer Space Affairs on the basis of submissions from the following United Nations entities: the Department of Field Support and the Department of Economic and Social Affairs of the Secretariat, the Economic Commission for Africa (ECA), the Economic and Social Commission for Asia and the Pacific (ESCAP), the Office for Disarmament Affairs of the Secretariat, the Office for Outer Space Affairs, the International Telecommunication Union (ITU), the World Health Organization (WHO) and the World Meteorological Organization (WMO).

9. The present report adds to the description of activities contained in the reports of the Secretary-General on the coordination of space-related activities within the United Nations system for the periods 2010–2011 (A/AC.105/961), 2012–2013 (A/AC.105/1014), 2014–2015 (A/AC.105/1063) and 2016–2017 (A/AC.105/1115) and reflects activities planned for the period 2018–2019. Additional information is available on the website dedicated to the coordination of outer space activities within the United Nations system (www.un-space.org).

II. Reinforcing synergies in efficiency measures in the use of space science, technology and applications within the United Nations system in support of global development efforts

A. Space economy

10. In the 2030 Agenda, Member States have established prosperity as one of their overarching aspirations, committing themselves to ensuring that all human beings can enjoy prosperous and fulfilling lives and that economic, social and technological progress occurs in harmony with nature. The same aspiration is reflected in the space economy pillar. Space science, technology and applications create value and benefits contributing to economic growth and serve as major drivers for a dynamic economy.

11. Looking towards UNISPACE+50 in 2018, the Office for Outer Space Affairs launched a series of high-level forums under the umbrella of the United Nations on the theme "Space as a driver for socioeconomic sustainable development", giving the space community an opportunity to address cross-sectoral matters by integrating the economic, environmental, social, policy and regulatory aspects of space activities in pursuit of global sustainable development, as well as to forge new partnerships and

set new frameworks for international cooperation. The first and second high-level forums on space as a driver for socioeconomic sustainable development were held in Dubai, United Arab Emirates, in 2016 and 2017, respectively, as part of the preparations for UNISPACE+50 with the aim of advancing the debate on the role of space science and technology in fostering global development. The third High-level Forum on space as a driver for socioeconomic sustainable development, to be held in Bonn, Germany, from 13 to 16 November 2018, is to continue to demonstrate the broad benefits of space as an area of innovation, inspiration, interconnectedness, integration and investment, and to strengthen unified efforts at all levels and among all relevant stakeholders in the space sector.

12. In its resolution 72/77, the General Assembly welcomed the adoption of the African Space Policy and Strategy by the Assembly of the African Union at its twenty-sixth ordinary session, held in Addis Ababa in January 2016, and noted that that achievement marked the first step towards the realization of an African outer space programme within the framework of the African Union Agenda 2063. More information on how United Nations entities can assist African countries is contained in a note by the Secretariat entitled "Space benefits for Africa: contribution of the United Nations" (A/AC.105/941).

13. ECA actively contributed to the preparation of the African Space Policy and Strategy through a working group of African Union member States guided by sectoral ministerial conferences. The Policy and Strategy contains ambitious goals to mobilize the continent to develop the institutions and capacities necessary to harness space technologies for socioeconomic benefits so as to improve the quality of life and create wealth for Africans.

14. ESCAP is currently developing a plan of action for the Asia-Pacific region on space applications for sustainable development (2018–2030) that is intended to guide the work of the regional space technology applications programme to implement the 2030 Agenda. The plan of action will contain strategies specific to the Asia-Pacific context that cover people, the environment and the economy while drawing from and contributing to global initiatives including the UNISPACE+50 process. The plan of action will also focus on the priorities outlined in the ESCAP publication "Regional roadmap for implementing the 2030 Agenda for Sustainable Development in Asia and the Pacific", namely social development, disaster risk reduction and resilience, climate change, the management of natural resources, seamless connectivity for the 2030 Agenda and energy, to be pursued by strengthening regional mechanisms for the implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030 and the Paris Agreement on climate change, among other things. The plan of action will set out ways of harnessing frontier technologies and their applications, as well as implementation and evaluation plans for several years that cover thematic areas of interest and are linked to global development frameworks and initiatives on the use of space data and space information.

15. The impact of extreme weather events and climate change on economic development, food security, health and migration continues to increase, as highlighted in the WMO publication "Statement on the state of the global climate in 2017". With countries working to fulfil their commitment to the 2030 Agenda, the demand for accessible and accurate weather, climate, hydrological, marine and related environmental services will continue to grow in the years ahead. To meet this demand, WMO, through its Space Programme, conducts a wide range of activities and acts as a bridge between satellite operators and users with the overall objective of promoting the wide availability and utilization of satellite data and products for weather, climate, water and related applications by WMO members. Data acquired by environmental and meteorological satellites have contributed to improving weather and climate predictions. With the deployment of a growing number of operational satellite constellations, this development is expected to continue.

16. Two topics related to space will be considered during the ITU Plenipotentiary Conference to be held in Dubai, United Arab Emirates, from 29 October to

16 November 2018. The first is a decision whether ITU should become the supervisory authority of the international registration system under the Protocol to the Convention on International Interests in Mobile Equipment on Matters Specific to Space Assets. The second topic is the progress made since the Plenipotentiary Conference adopted, in Busan, Republic of Korea, in 2014, its resolution 186 on strengthening the role of ITU with regard to transparency and confidence-building measures in outer space activities. In Geneva, shortly after the Conference, namely from 3 to 7 December 2018, ITU will host its world radiocommunication seminar, a capacity-building event for spectrum regulators and the satellite industry, with in-depth presentations on the provisions of the ITU Radio Regulations applicable to satellite systems and training workshops to get hands-on experience with ITU notification procedures.

17. The end of 2018 and the beginning of 2019 will see the final preparations for the World Radiocommunication Conference 2019, to be held in Sharm-el-Sheikh, Egypt, from 28 October to 22 November 2019. The Conference will revise the Radio Regulations, the international rules governing the use of radio-frequency spectrum and satellite orbits. Multiple items related to satellite systems are on the agenda, such as: finding globally harmonized frequency bands for the telecommand and telemetry of satellites with short missions such as nanosatellites; defining a regulatory framework that will enable the use of Earth stations in motion to provide Internet connectivity on planes, ships, trains or other means of transportation; establishing regulatory provisions to allow non-geostationary mega-constellations to be deployed and operated at a steady pace commensurate with existing launch capabilities; and identifying frequencies for the space component of the Maritime Very High Frequency (VHF) Data Exchange System. The topic of suborbital flights will also be addressed, in particular the question whether radio stations used for such flights should be considered as belonging to the aeronautical or to the space domain.

18. The Office for Outer Space Affairs continues to discharge the obligations of the Secretary-General under the United Nations treaties and principles on outer space. Since the establishment of the Register of Objects Launched into Outer Space in 1961, more than 7,300 functional space objects (satellites, probes, landers, crewed spacecraft and space station flight elements) have been registered with the Secretary-General by more than 55 States and intergovernmental organizations. In 2017, the Office processed registration submissions for 489 functional space objects, the largest number in any single year. A further 64 non-functional space objects (rocket stages, inter-satellite structures and space debris) were registered. With the ever-increasing number of space object launches, the registration system plays an important role in ensuring the responsible conduct of space activities that have the potential of providing economic benefits for sustainable development on Earth.

19. The Office, through workshops and expert meetings organized under the United Nations Programme on Space Applications, brings together experts, decision makers and practitioners to share experience and knowledge among regions, with the aim of defining the actions and follow-up activities required to improve the use of space technology for the management of natural resources and for monitoring the environment. In 2018, the Office will conduct its activities in Argentina (on global navigation satellite systems), Austria (on space partnership for the Sustainable Development Goals), Brazil (on basic space technology), China (on the International Committee on Global Navigation Satellite Systems) and Germany (on innovation and infrastructure for development), and has already held one conference in Pakistan (on space technology for water resources management). In December 2017, the Office for Outer Space Affairs and the United Nations Development Programme joined forces by signing a memorandum of understanding to facilitate cooperation in the use of space science and technology to support and promote global sustainable development initiatives of the United Nations.

20. In order to maximize the benefits of the use and application of global navigation satellite systems (GNSS) to support sustainable development, the Office, consistent with its role as the executive secretariat for the International Committee on GNSS,

will continue to promote cooperation on issues related to GNSS compatibility, interoperability, performance and other space-based positioning, navigation and timing matters. China and India expressed their interest in hosting the meetings of the Committee in 2018 and 2019, respectively. The Office will continue to foster cooperation between the Committee and the regional centres for space science and technology education, affiliated to the United Nations, which also serve as information centres for the Committee, and will focus on capacity-building, in particular in relation to GNSS education.

B. Space society

21. The 2030 Agenda is universal and transformative, and people are at its core. In it, Member States have committed themselves to ensuring that all human beings can fulfil their potential in dignity and equality and in a healthy environment. The space society pillar fully accords with the people-centred nature of the 2030 Agenda and extends beyond UNISPACE+50. The value of space activities is increasingly recognized by United Nations entities. In their daily work they increasingly use space technology and applications and space-derived data and information for improving people's quality of life, including in the areas of public health, human security and welfare, disaster management and humanitarian assistance.

22. Under UNISPACE+50 thematic priority 7 (Capacity-building for the twenty-first century), the Office for Outer Space Affairs has been tasked with placing special emphasis on activities targeting the needs of women in developing countries. To pursue that objective, the Office has joined forces with the United Nations Entity for Gender Equality and the Empowerment of Women (UN-Women) to hold an expert meeting on space for women in New York in October 2017. The purpose of the expert meeting was to share ideas and expertise regarding space and women, enhance existing partnerships and forge new ones, strengthen and deliver targeted capacity-building and technical advisory activities, and promote efforts to encourage the participation of women and girls in science, technology, engineering and mathematics education, with a special focus on developing countries.

23. In the public and global health domains, space science, technology and applications, including Earth observation and remote sensing; telecommunication, positioning and tracking; and space-based research play a crucial role in supporting decision-making, improved care, education and early warning measures. More information on activities undertaken by various United Nations entities in the area of space and global health is contained in the special report by UN-Space on the use of space science and technology within the United Nations system for global health (A/AC.105/1091).

24. Key applications of satellite technology in this field include telemedicine, tele-health, disease surveillance systems and health mapping. Space technology offers appropriate and affordable tools to achieve universal health coverage, in particular in remote and rural areas. Universal health coverage is one of the six leadership priorities of the twelfth general programme of work of WHO, which covers the period 2014–2019.

25. WHO is exploring ways and means for improving and promoting the use of space technologies, space systems and space-derived information and data in the global health domain, subject to the availability of sufficient financial and human resources. In so doing, WHO focuses on the following aims: (a) to strengthen country health systems and the delivery of health services at national and subnational levels; (b) to assist in forecasting and raising the alert of public health epidemics at national and subnational levels; (c) to respond to health emergencies; and (d) to provide technical assistance to Member States in establishing a research agenda on the benefits of space science and technologies to public health. In particular, WHO is focusing its efforts on Earth observation data relevant to climate and climate change as a determinant of health; tele-health and epidemiology; water mapping, quality

assessment, sanitation and hygiene; big data analytics, pattern recognition and visualization; education, training and capacity-building; emergency medical response and routine health care; and healthy living and non-communicable diseases.

26. In the area of space technology applications and public health, WHO has held discussions with numerous national space agencies about using existing technological capabilities in the service of public health and jointly developing new capabilities, in particular in e-health and telemedicine, deployable and miniature laboratory technology, and environmental monitoring. In the area of research, applications and technology relating to human spaceflight, a number of health areas are being explored, including personalized medicine, nutrition, healthy living and exercise, health issues associated with ageing, and water treatment and sanitation. In the area of education and capacity-building, WHO is working with space agencies to promote healthy living and exercise among school children, and on programmes to train teachers on specific subjects such as climate change.

27. To foster a dialogue about improving the utilization of space-based technologies and data in support of global health, and to showcase selected global health initiatives and their various uses of space technologies, data access, data provision services and information-sharing, the United Nations/WHO/Switzerland Conference on Strengthening Space Cooperation for Global Health was held in Geneva in August 2017 (see A/AC.105/1161). To implement the Conference's recommendations, the Office for Outer Space Affairs and WHO are working on a memorandum of understanding to strengthen institutional arrangements for effective collaboration.

28. At its fifty-fifth session, held in January and February 2018, the Scientific and Technical Subcommittee, recognizing the importance of Sustainable Development Goal 3 (Ensure healthy lives and promote well-being for all at all ages) and of UNISPACE+50 thematic priority 5 (Strengthened space cooperation for global health), and taking note of the final report on thematic priority 5 (A/AC.105/1172) and of the progress report by the Co-Chairs of the Expert Group on Space and Global Health of the Scientific and Technical Subcommittee on the fourth meeting of the Expert Group (A/AC.105/C.1/2018/CRP.17), agreed to establish a new item entitled "Space and global health" on its agenda and a working group under that item, with Switzerland as Chair.

29. United Nations entities are working with space agencies to maximize the use of Earth observation data and products relevant to health that are readily available through existing mechanisms and portals, such as the Group on Earth Observations and Copernicus. Focus areas could include water mapping, linking geographical information system and health data, climate change and determinants of health, and disaster response. WMO works closely with WHO on health-related issues such as through the WHO/WMO joint office on health and climate and the global platform on air quality and health. Collaboration is ongoing with other United Nations bodies, agencies and international organizations, including the Statistical Commission, the Group on Earth Observations and the World Bank.

30. As part of efforts to deepen collaboration in the European region, WHO and the European Space Agency are expanding their efforts to achieve, at the national level, the health-related targets of the 2030 Agenda through an integrated approach and, in line with the WHO priority of universal health coverage, the achievement of Sustainable Development Goal 3 and the future WHO thirteenth general programme of work.

31. United Nations entities use space technology in their activities aimed at enhancing food security and sustainable food production. More information on this topic is contained in the special report of UN-Space on the use of space technology within the United Nations system for agriculture development and food security (A/AC.105/1042).

32. Through its Regional Drought Mechanism, ESCAP helps countries to utilize space-derived information available from spacefaring countries in the Asia-Pacific

region and service nodes in China, India and Thailand to ensure comprehensive real-time drought monitoring, manage an early warning system and seamlessly link long-term climate scenarios with seasonal climate outlooks. The Mechanism works to determine the most appropriate products and services obtained with frontier space technology, build capacity and disseminate information to people in need.

33. To further develop its Regional Drought Mechanism, ESCAP has established new partnerships with United Nations agencies and regional institutes with a view to offering a complementary range of information and knowledge products and services to support drought management, contribute to the future implementation of the regional plan of action on space applications for sustainable development for the period 2018–2030 and build capacity to use its information and services. The information and services are to be provided by various countries through regional cooperation. They will be twinned with drought-prone developing countries to support them in building resilience to drought.

34. ESCAP and the Association of Southeast Asian Nations (ASEAN) are preparing a joint study on drought in which they will propose to capitalize on knowledge-based innovations by promoting risk-sensitive policies and interventions based on in-season and long-term drought monitoring and assessment. The study contains strong scientific evidence that the drought risk in ASEAN countries is growing, especially since the 2015/2016 El Niño event, which triggered large-scale drought, floods and landslides and severely affected agriculture. The study will further show that the incidence of the El Niño phenomenon is likely to increase in the future.

35. WMO provides climate services to farmers, herders and fishermen in order to promote sustainable agricultural development, increase agricultural productivity and contribute to food security through its Agricultural Meteorology Programme. Other contributing programmes of WMO are the Hydrology and Water Resources Programme and the Integrated Drought Management Programme, which are informed by satellite-derived products. WMO is also strengthening its collaboration with the Food and Agriculture Organization of the United Nations to deepen cooperation and respond to climate variability and climate change and to strengthen agro-meteorological services.

36. The effectiveness of response and relief operations during and after natural disasters and in complex humanitarian emergencies is highly dependent on space technology. Space technology facilitates data collection and transmission, smooth and expedient communications, and tracking and tracing efforts during such devastating events. The United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) promotes the use of space-based information in disaster management, disaster risk reduction and emergency response operations with a view to closing the gap between the information's potential and the actual use currently made of it. UN-SPIDER raises awareness of the benefits of space technologies for disaster management and is aimed at building the capacities of Member States to use those benefits effectively.

37. Combining regional and global approaches, UN-SPIDER will continue to organize technical advisory missions, conferences, workshops, discovery days and thematic expert meetings. Such events enable Member States to exchange knowledge and experiences and learn about innovative methods, best practices and opportunities to access satellite-derived resources. In 2018, technical advisory services and training sessions will be held in Bangladesh, Benin, Cambodia, Cameroon, Ghana, Namibia, Nepal, Nigeria, Sierra Leone, Sri Lanka, Viet Nam and Zimbabwe. International workshops will be held in China, Germany, India and Mongolia to promote and foster the use of Earth observation in the full cycle of disaster management and support implementation of the Sendai Framework for Disaster Risk Reduction.

38. UN-SPIDER serves as the secretariat of the Global Partnership using Space-based Technology Applications for Disaster Risk Reduction (GP-STAR), a multi-stakeholder, voluntary partnership launched at the Third World Conference on Disaster Risk Reduction, held in Sendai in 2015. GP-STAR supports the

implementation of the Sendai Framework by, inter alia, giving advice to governments, organizations and projects on the use of space technologies and applications in disaster risk reduction efforts, and through the provision of relevant publications. In its function as secretariat, the UN-SPIDER programme organized and conducted monthly videoconferences to ensure the implementation of the workplan, published a brochure giving an overview of GP-STAR, and prepared and conducted a side event during the 2017 Global Platform for Disaster Risk Reduction, held in Cancún, Mexico.

39. The Office for Outer Space Affairs will continue to support the International Working Group on Satellite-based Emergency Mapping. The Working Group was formed in the aftermath of the largely uncoordinated emergency mapping efforts during the Haiti earthquake of 2010, to improve coordination and work-sharing among the entities involved.

40. The WMO Disaster Risk Reduction Programme is aligned with the Sendai Framework. Its activities are integrated and coordinated with other international, regional and national organizations. To support disaster risk reduction efforts, WMO is preparing to operate a global multi-hazard early warning system. The system will provide WMO members, United Nations agencies, humanitarian organizations, Governments and other relevant stakeholders with aggregated and standardized authoritative multi-hazard alerts and warnings based on the Common Alerting Protocol. The alerts and warnings will be issued by members' national meteorological and hydrological services and other officially registered alerting authorities. The Climate Risk and Early Warning Systems initiative is aimed at mobilizing the funds required to strengthen risk information and early warning systems in vulnerable countries. The WMO Space Programme is supporting those efforts.

41. The ESCAP publication *Leave No One Behind: Disaster Resilience for Sustainable Development — Asia-Pacific Disaster Report 2017* shows that those countries in the region that have the least capacity to prepare for or respond to disasters suffer the greatest impact. It also shows that future natural disasters may be more destructive. ESCAP research indicates that, beyond the human cost, 40 per cent of global economic losses from disasters between 2015 and 2030 will occur in the Asia and the Pacific, a region that accounts for around 36 per cent of global gross domestic product. ESCAP suggests that measures for disaster risk reduction should take account of the shifting risks associated with climate change, especially in risk hotspots where a greater likelihood of change coincides with a higher concentration of poor, vulnerable or marginalized people.

42. ESCAP, in close collaboration with partners in the United Nations system and with ASEAN, has developed a series of handbooks offering guidance in harnessing innovative space applications to cope with disaster risk in the region. The titles in the series include *Sharing Space-based Information: Procedural Guidelines for Disaster Emergency Response in ASEAN Countries* (developed in collaboration with UN-SPIDER and the Operational Satellite applications Programme of the United Nations Institute for Training and Research), *Specific Hazards: Handbook on Geospatial Decision Support in ASEAN Countries* and *Innovations in Disaster Rapid Assessment: A Framework for Early Recovery in ASEAN Countries*. The series promotes the development of institutional capacity for countries that wish to include innovative space-based information in their disaster risk management processes, and to address the needs of geospatial information providers and decision makers.

43. ESCAP has been working with Pacific countries and regional institutes to strengthen multi-hazard early warning systems in the Pacific region. Work has focused on the development of knowledge and the capacity to use space technology and geographical information systems applications as crucial elements in efforts to attain universal access to disaster early warning information. ESCAP and its regional partners have conducted a series of intensive training courses to build capacity. They have also completed pilot projects in Fiji, the Federated States of Micronesia, Papua New Guinea, Solomon Islands and Tonga which included technical service, tailored toolboxes and model development for weather research forecasting, ocean wave

monitoring and drought early warning. The project also contributed to South-South cooperation through the sharing of expertise available in institutes in Thailand and Indonesia.

44. WMO is the co-custodian for Sustainable Development Goal 13 (Take urgent action to combat climate change and its impacts) and leads the work on the Global Climate Observing System (GCOS). GCOS is an integrated, long-term endeavour to systematically observe the Earth's changing climate and to identify the measurements required to support adaptation measures and the way in which they could support observations at the local and regional levels. Many observation products do not yet exist and specific action is required to develop guidance for the provision of high-resolution global or regional data sets obtained from satellite products or by downscaling model results. More specifically, there is a GCOS implementation plan that is based on a set of essential climate variables that have been identified. In the near future, measurements of anthropogenic greenhouse gas fluxes made on board space-borne platforms will be available to augment the bottom-up approaches recommended in the guidelines of the Intergovernmental Panel on Climate Change and to improve integrated estimates of emissions in line with the Paris Agreement on climate change for a global stocktaking exercise once every five years. The first global round of stocktaking, to be held in 2023, will benefit from prototype systems. Those prototypes are expected to be developed into a more operational system at a later date.

45. GCOS activities are closely coordinated with those space agencies that are developing and operating relevant space-borne platforms, including the Committee on Earth Observation Satellites (CEOS) and the Coordination Group for Meteorological Satellites (CGMS). In 2010, CEOS and CGMS together established the Working Group on Climate, which coordinates and encourages collaborative activities between the world's major space agencies in the area of climate monitoring. The overarching goal is to improve the systematic availability of climate data records through the coordinated implementation and further development of a global architecture for climate monitoring from space.

46. More information is contained in the special report of UN-Space on the use of space technology within the United Nations system to address climate change issues (A/AC.105/991).

C. Space accessibility

47. The 2030 Agenda will be implemented by all countries and stakeholders, acting in collaborative partnership and with the determination to take the bold and transformative steps that are urgently needed to shift the world onto a path towards sustainability and resilience. Space-derived information is a key decision-making tool for the efficient management of assets, environments and communities. Nonetheless, bottlenecks and gaps exist with respect to access to space-derived information and its interpretation, analysis and usage, because, at present, it is provided mainly by the private sector, Governments and specialized agencies. Efforts are being made within the United Nations system to increase and streamline the use of data and information derived from space-based platforms.

48. Promoting and facilitating the visibility, free accessibility and ease of utilization of space science data, in particular astronomical data, collected by space- and ground-based facilities is the objective of the Open Universe initiative of the Office for Outer Space Affairs, conducted in partnership with Italy. The initiative, recommended for establishment at the United Nations/Italy Workshop on the Open Universe Initiative held in Vienna in November 2017, is aimed at enhancing and completing the online availability and visibility of astronomical and space science data following internationally agreed standards; and promoting the development of software applications and educational and outreach environments for astronomy and space science to further the progress of society in terms of culture and knowledge, in

particular among young people and women, irrespective of the level of development of a country.

49. The United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) is the top intergovernmental global geospatial policymaking body. It fosters a geospatial approach to attaining the Sustainable Development Goals and has been successful in building a global architecture as well as regional geospatial committee architectures in Asia and the Pacific, the Americas, the Arab States, Europe and Africa. UN-GGIM has entered the second five-year phase of its work programme, in which its focus is on strengthening the national capabilities, capacities and institutional arrangements of geospatial information in Member States. The various work programmes put a strong emphasis on integrating national information systems for measuring and monitoring the progress towards Sustainable Development Goals, capacity-building and national-level implementation. The Department of Economic and Social Affairs and the Department of Field Support continue to provide UN-GGIM with Secretariat support.

50. UN-GGIM has asked the Secretariat for an overview of existing geospatial information resources, activities and governance arrangements within the United Nations system. During the seventh session of UN-GGIM, held in August 2017, the Secretariat reported that, as many coordination activities were being carried out on a "best efforts" basis by geospatial practitioners within and across the United Nations system and that the current informal collaborative mechanisms required attention from senior management of the United Nations and UN-GGIM so as to improve the coordination and coherence. As a direct outcome of its seventh session, UN-GGIM agreed to establish a United Nations system network under the umbrella of UN-GGIM. While the terms of reference, modalities and mechanisms of the new network are yet to be determined, the Secretariat is contacting actors interested in preparing its establishment within the United Nations system, to be endorsed by UN-GGIM at its eighth session, in August 2018.

51. At its fifth session, in August 2015, UN-GGIM created the working group on geospatial information and services for disasters to develop a strategic framework in which all stakeholders and partners involved in disaster risk reduction and/or emergency management could ensure that geospatial information and services are of high quality and can be accessed in a coordinated way to support decision-making and operations before, during and after disasters. At its seventh session, in August 2017, UN-GGIM adopted a strategic framework on geospatial information and services for disasters and endorsed the consideration of drafting a resolution to be presented for adoption by the Economic and Social Council. The draft resolution is currently being prepared by Member States for consideration by the Council in July 2018.

52. The United Nations Geographic Information Working Group held no plenary meeting in 2017. The Office for Outer Space Affairs voluntarily continued to act as Chair of the Working Group until another entity would volunteer to do so. At the same time, the Office hosted and managed, with support from the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization, the web server and mailing lists of the Working Group, thereby ensuring that communication and information-sharing within the United Nations system continued on all aspects of geospatial information management and data-sharing. It is still envisaged to convene a plenary meeting in late 2018 or early 2019 to address developments and cooperation requirements, to ensure the Working Group's continuity and to review future plans to adjust efforts to the current and future priorities of the United Nations system, including the Sustainable Development Goals. The Working Group and its members could possibly be re-engaged in the context of the newly proposed United Nations system network in the context of UN-GGIM.

53. The Regional Committee of United Nations Global Geospatial Information Management for Africa was established under the leadership of ECA. Through the work of the Regional Committee, Member States have agreed on a basic set of

concepts, practices, standards and guidelines for the development and management of geospatial information in Africa. The African Regional Spatial Data Infrastructure supports regional initiatives, such as the production of a seamless mosaic of digital elevation model data and the launch of a study to develop guidelines of best practices for geospatial data sets. In collaboration with the Department of Economic and Social Affairs and the Department of Field Support, ECA continues to follow up the validation process of the Second Administrative Level Boundaries data set project in Africa.

54. Through the international steering committee of the African Geodetic Reference Frame project, ECA has continued to develop a unified geodetic reference frame to contribute to the harmonization of geographic data and statistics in Africa. In 2018, 2019 and beyond, ECA will continue to champion the development and implementation of spatial data infrastructures in African countries, focusing on articulating policies, strategies and guidelines to develop and enhance the effective use of geospatial products and resources. Expert advice and technical support will be provided to member States and subregional and regional institutions to strengthen their geospatial information policies and resources.

55. Since 2016, ESCAP has provided around 320 satellite imagery and tailored tools and products to its member States for early warning, response and damage assessment relating to earthquakes, floods, drought, typhoons, cyclones and landslides. All of these space-based data, products and services were provided free of charge by ESCAP member States through the Regional Space Applications Programme for Sustainable Development network and the partnership with other United Nations agencies and international/regional initiatives. Their value was equivalent to approximately $1.4 million.

56. The Geospatial Information Section of the Department of Field Support continued to coordinate the provision of selected products and services to the Secretariat to support the management of operations, situational awareness and geospatial intelligence for crisis response operations. The volume of analytical products and services based on satellite imagery that has been provided to the Security Council and its subsidiary organs and to the United Nations Operations and Crisis Centre have increased at a rapid pace. This trend reflects the growing interest of senior management of the United Nations system to leverage evidence-based data and information in its decision-making process.

57. In early 2016, new contracts were concluded with vendors for the provision of a wide range of medium- and high-resolution, optical and radar satellite imagery. Those contracts include services and products with added value that are based on data derived from satellite imagery, such as change detection or geospatial intelligence used for crisis response operations. Another contract was concluded for the provision of advanced geospatial services that include feature extraction, to produce large-scale topographic data and maps, and image analysis.

58. The Office for Outer Space Affairs is availing itself of the memorandum of understanding with the China National Space Administration for the provision of imagery for disaster management, monitoring the effects of climate change and supporting efforts to attain the Sustainable Development Goals. The satellite images were offered during emergencies and plans are being made to offer images for use in specific projects in developing countries.

59. The Office is also availing itself of the memorandum of understanding with DigitalGlobe to increase awareness of new, very high-resolution space-based data and services within the United Nations, and to promote the availability of and access to such data and the provision of open data to the United Nations system during disasters. In the spirit of the memorandum of understanding, DigitalGlobe will continue to provide archived and contemporary imagery freely accessible to the international community to support emergency response operations. Also in the spirit of the memorandum, DigitalGlobe, through its Open Data programme, will continue to

provide archived and newly collected, after-the-event imagery freely accessible to the international community to support responses to major disasters globally.

60. Under the WMO Space Programme, several databases are maintained that contribute to space accessibility. They include the Observing Systems Capability Analysis and Review Tool, a database of Earth observation payloads and missions and observation requirements to support Earth observation applications, gap-analysis studies and global coordination, the Satellite User Readiness Navigator portal, which is intended to help Members prepare for the next generation of meteorological satellites, databases on data products[1] and processing tools.[2]

61. CGMS ensures the global end-to-end coordination of meteorological satellite systems between satellite operators and user communities such as WMO and the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization. CGMS encourages complementarity, compatibility and mutual backup in the event of system failure, and does so through cooperative mission planning, compatible meteorological data products and services, and the coordination of space- and data-related activities, thus complementing the work of other international satellite coordinating mechanisms.

62. The WMO/CGMS Virtual Laboratory for Training and Education in Satellite Meteorology is a global network of specialized training centres and meteorological satellite operators working together to improve the utilization of data and products from meteorological and environmental satellites. It was established by WMO, through its Space Programme, and CGMS to support capacity-building.

63. The Office for Outer Space Affairs continues to participate actively in the working groups of CEOS, acting, by virtue of its mandate, as a liaison between the United Nations and the CEOS community. The Office will continue to contribute to and support capacity-building activities related to the provision of and access to space-based data within the CEOS Working Group on Disasters and the CEOS Working Group on Capacity-building and Data Democracy by organizing joint training workshops for developing countries. In 2017, the Office supported a training course held in Gabon that was coordinated by the Working Group on Capacity-building and Data Democracy. Its topic was the use of synthetic aperture radar satellite imagery.

64. The UN-SPIDER knowledge portal contains databases made up of freely available satellite data, derived products and software, and compilations of all relevant maps and resources for selected major disasters. The Office for Outer Space Affairs is strengthening the UN-SPIDER network of regional support offices, which currently has 21 members, to ensure that recommended practices and other references, tools and services are shared more widely.

D. Space diplomacy

65. The scale and ambition of the 2030 Agenda, underpinned by the United Nations values of peace, dialogue and international cooperation, require revitalized international partnership to ensure its implementation. Through the 2030 Agenda, world leaders have envisaged a world in which good governance and an enabling environment at the national and international levels are essential for sustainable development, including sustained and inclusive economic growth, social development, environmental protection and the eradication of poverty and hunger, all of which would benefit from stronger space governance and supporting structures at all levels, including improved space-based data and space infrastructure.

66. The Office for Outer Space Affairs continues to support the Committee on the Peaceful Uses of Outer Space and its subsidiary bodies in promoting international

[1] See https://www.wmo-sat.info/product-access-guide/.

[2] See http://www.wmo.int/pages/prog/sat/processingtools_en.php.

cooperation in space activities for peaceful purposes, including in preparation for UNISPACE+50, which offers a unique opportunity for Member States to reflect on more than 50 years of achievement in space exploration and to look towards the future. The UNISPACE+50 high-level segment process, to be held on 20 and 21 June 2018 and open to all States Members of the United Nations, is expected to culminate in a resolution to be considered at the seventy-third session of the General Assembly. In accordance with its resolution 72/79, the Assembly will consider in plenary meeting at its seventy-third session an agenda item entitled "Space as a driver of sustainable development" in the context of UNISPACE+50.

67. The General Assembly, in accordance with its resolution 71/90, convened a joint half-day panel discussion of its Disarmament and International Security Committee (First Committee) and Special Political and Decolonization Committee (Fourth Committee) to consider possible challenges to space security and sustainability. The panel was organized jointly by the Office for Outer Space Affairs and the Office for Disarmament Affairs and held in New York on 12 October 2017. The programme, a summary of the debate and the presentations are available on the website of the Office for Outer Space Affairs.

68. Pursuant to requests by the General Assembly, the Office for Disarmament Affairs undertook various efforts to support States in the implementation of the recommendations of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities (see A/68/189). The Office for Disarmament Affairs also continued to support the discussion on the implementation of transparency and confidence-building measures in various disarmament forums, including the Conference on Disarmament, the United Nations Disarmament Commission and the First Committee.

69. In accordance with General Assembly resolution 71/82, the Disarmament Commission held an informal discussion on the practical implementation of transparency and confidence-building measures in outer space activities with the goal of preventing an arms race in outer space at its 2017 session. On 21 February 2018, the Disarmament Commission decided that the second of two substantive items for its 2018–2020 cycle would bear the title "In accordance with the recommendations contained in the report of the Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities (A/68/189), preparation of recommendations to promote the practical implementation of transparency and confidence-building measures in outer space activities with the goal of preventing an arms race in outer space".

70. In its resolution 72/250 on further practical measures for the prevention of an arms race in outer space, the General Assembly requested the Secretary-General to establish a new group of governmental experts to consider and make recommendations on substantial elements of an international legally binding instrument on the prevention of an arms race in outer space, including on the prevention of the placement of weapons in outer space. The group will meet in 2018 and 2019.

71. In February 2018, the Conference on Disarmament decided to establish five subsidiary bodies, including one on its agenda item on preventing an arms race in outer space. The subsidiary bodies have been tasked with seeking to reach an understanding on common areas, deepening technical discussions, and considering effective measures, including legal instruments, for negotiations.

72. More information on relevant activities undertaken by various United Nations entities is contained in the special report by UN-Space on the role of United Nations entities in supporting Member States in the implementation of transparency and confidence-building measures in outer space activities (A/AC.105/1116).

73. Building on the success of the series of ten United Nations workshops on space law, the Office for Outer Space Affairs will hold the first United Nations Conference on Space Law and Policy in Moscow from 11 to 13 September 2018. The Conference

is being organized jointly with the Government of the Russian Federation and the State Space Corporation "Roscosmos". Participants will be given an overview of the legal regime governing the peaceful uses of outer space and will examine the broader perspective of space security, including transparency and confidence-building measures in outer space activities. Discussions will be held on ways and means of maintaining outer space for peaceful purposes, challenges to the long-term sustainability of outer space activities, legal aspects of space debris mitigation and remediation, space traffic management and the exploration, exploitation and utilization of space resources. The Conference will also study trends in and challenges to the progressive development of space law and assess further needs for capacity-building, assistance and outreach in space law and policy.

74. Given the growing number of benefits derived from space science and technology applications, space activities by all the main players continue to expand rapidly. This not only increases interaction between the aviation and space communities, both commercial and private, but also makes the need more pressing to explore existing regulatory mechanisms and operational practices in the fields of aviation and space transportation. To address that need, the International Civil Aviation Organization (ICAO) and the Office for Outer Space Affairs hosted a series of aerospace symposiums held in Montreal, Canada, in March 2015, in Abu Dhabi in March 2016 and in Vienna in August 2017 (see A/AC.105/1155).

75. Participants in the series of symposiums have made efforts to strengthen the dialogue between the aviation and space communities. Participants expressed the view that the unique, coordinated inter-agency effort should be reflected in the second phase of cooperation and in the work of ICAO and the Office for Outer Space Affairs. In view of the rapid development of commercial space transportation and the inherently different international regimes for aviation, space flight and space activities, participants observed a need for better intergovernmental coordination with the involvement of the Office for Outer Space Affairs, ICAO, ITU and the International Maritime Organization in areas of concern with respect to the launching of space vehicles from maritime areas.

76. The seventeenth World Meteorological Congress, held in May 2015, tasked WMO with ensuring the international coordination of operational monitoring and forecasting of space weather with a view to supporting the protection of life, property and critical infrastructure and the economic activities affected by space weather. In June 2016, the WMO Executive Council approved a four-year plan for WMO activities related to space weather for the period 2016–2019. The four-year plan is aimed at enabling States members of WMO to establish fully operational space weather services, share observation data, products and best practices and ensure interoperability and standardization, as appropriate, to efficiently respond to global challenges related to space weather.

77. The Executive Council further agreed to replace the WMO expert team on space weather, named Inter-Programme Coordination Team on Space Weather, which had been established in May 2010 with the newly established Inter-Programme Team on Space Weather Information, Systems and Services and to task the new Inter-Programme Team with coordinating the space weather activities conducted under various WMO programmes and by partner organizations, and to provide guidance to WMO members. The Inter-Programme Team commenced its work in early 2017 and at present includes experts from 23 member States and six international organizations.

78. The eighteenth World Meteorological Congress, to be held in June 2019, is expected to adopt a strategic plan for the period 2020–2023. The new strategic plan will allow WMO to remain fit for purpose and to become even more nimble and cost-effective.

79. The World Radiocommunication Conference 2019 will prepare the agenda of the next Conference, planned for 2023. One item that may be included concerns the

radio spectrum needs of space weather sensors and the means to protect them from interference.

80. The Committee on the Peaceful Uses of Outer Space first started considering issues related to space weather decades ago as part of its general discussions. It continues to do so under dedicated items on the agenda of the Scientific and Technical Subcommittee, such as the single issue/item for discussion on solar terrestrial physics (in 2004), the item on support to proclaim the year 2007 International Geophysical and Heliophysical Year (in 2005), the items under the multi-year workplans relating to the International Heliophysical Year 2007 (since 2006) and the International Space Weather Initiative (since 2010), and under a regular item on space weather (since 2010).

81. Expert group C on space weather was established under the Working Group on the Long-term Sustainability of Outer Space Activities of the Scientific and Technical Subcommittee, under the Subcommittee's agenda item on long-term sustainability of outer space activities. Expert group C was co-chaired by Canada and Japan. In 2014, it produced a working report (A/AC.105/C.1/2014/CRP.15) that served as input to the agreed guidelines for the long-term sustainability of outer space activities, in particular guideline 16 (Share operational space weather data and forecasts) and guideline 17 (Develop space weather models and tools and collect established practices on the mitigation of space weather effects).

82. In 2014, under its agenda item on space weather, the Scientific and Technical Subcommittee established the Expert Group on Space Weather. That Expert Group was mandated to promote awareness, provide guidance and enable communication and cooperation in space weather-related activities among States members of the Committee on the Peaceful Uses of Outer Space and related national and international organizations. At its fifty-fifth session, in 2018, the Subcommittee recommended that the Expert Group continue its work, in accordance with the recommendations contained in the Expert Group's progress report (A/AC.105/C.1/2018/CRP.14).

83. At its fifty-ninth session, in 2016, the Committee on the Peaceful Uses of Outer Space endorsed seven UNISPACE+50 thematic priorities. The objectives under thematic priority 4 (International framework for space weather services) were to strengthen the reliability of space systems and their ability to respond to the impact of adverse space weather; to develop a space weather road map for international coordination and information exchange on space weather events and their mitigation, through risk analysis and assessment of user needs; to recognize space weather as a global challenge and the need to address the vulnerability of society as a whole; increase awareness through developed communication, capacity-building and outreach; and to identify governance and cooperation mechanisms to support this objective. For further information, see the report on thematic priority 4 (A/AC.105/1171).

84. As a flagship event under the thematic priority, the Office for Outer Space Affairs held the United Nations/United States of America Workshop on the International Space Weather Initiative in Boston, United States, from 31 July to 4 August 2017 (see A/AC.105/1160). The event was dedicated to the progress achieved in the ten years since the International Heliophysical Year 2007 and gave participants an opportunity to discuss strategies and future activities.

85. More information on activities undertaken by various United Nations entities in this context is contained in the special report by UN-Space on space weather (A/AC.105/1146).